

## CLAIMS

What we claim:

1           1.     A method of allocating a communication medium between a plurality of  
2 stations in a network, comprising:  
3           dynamically assigning one of the stations as a starting bus master;  
4           the starting bus master establishing an order in which the stations have access to the  
5 communication medium;  
6           appointing an ending bus master to a last station in the order;  
7           the starting bus master sending the order to all of the stations in the network;  
8           the starting bus master initiating a message sequence with a beginning of sequence  
9 message;  
10          the stations transmitting their messages after the beginning of sequence message  
11 according to the order; and  
12          the ending bus master appending an end of sequence message which indicates an end  
13 of the message sequence.

1           2.     The method as set forth in claim 1, wherein transmitting messages comprises  
2 monitoring at each station for the message from a preceding station in the order.

1           3.     The method as set forth in claim 1, wherein transmitting messages comprises  
2 transmitting message of varying sizes.

1           4.     The method as set forth in claim 1, wherein transmitting messages includes  
2 transmitting a synch message indicating that no data is being transmitted.

1           5.     The method as set forth in claim 1, wherein assigning one of the stations as the  
2 starting bus master comprises assigning the bus master to a station at an end of the  
3 communication medium.

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1           6.     The method as set forth in claim 5, wherein assigning the starting bus master  
2 to the station at the end of the communication medium comprises sending queries to each  
3 station in the network and measuring delay time associated with responses from each station.

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1           7.     The method as set forth in claim 1, wherein assigning the starting bus master  
2 comprises assigning the first station as the bus master.

1           8.     The method as set forth in claim 1, further comprising detecting a new station  
2 and adding the new station to the order.

1           9.     The method as set forth in claim 8 wherein adding the new station to the order  
2 is performed by the starting bus master and the starting bus master sends the order having the  
3 new station to all stations.

1           10.    The method as set forth in claim 8, wherein adding the new station to the order  
2 is performed by all stations.

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1 11. The method as set forth in claim 8, wherein detecting the new station  
2 comprises detecting a new station message inserted by the new station after the end of  
3 sequence message.

1 12. The method as set forth in claim 8, further comprising assigning the starting  
2 bus master to the new station.

1 13. The method as set forth in claim 8, wherein detecting and adding the new  
2 station dynamically recomputes the length of the communication medium.

1 14. The method as set forth in claim 1, further comprising detecting a removal of  
2 one of the stations from the network and removing the one station from the order.

1 15. The method as set forth in claim 14, wherein removing the one station from  
2 the order is performed by the starting bus master and the starting bus master provides the  
3 order without the one station to all stations.

1 16. The method as set forth in claim 14, wherein removing the one station from  
2 the order is performed by all stations.

1 17. The method as set forth in claim 14, wherein detecting the removal of the one  
2 station comprises not detecting any message from the one station for a period of time.

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1 18. The method as set forth in claim 14, wherein the one station removed from the  
2 network comprises the starting bus master and the method further comprises assigning the  
3 starting bus master to another one of the stations in the network.

1 19. The method as set forth in claim 14, wherein the one station removed from the  
2 network comprises the ending bus master and the method further comprises assigning the  
3 ending bus master to another one of the stations in the network.

1 20. The method as set forth in claim 14, wherein detecting the removal of the one  
2 station comprises reducing a length of the communication medium.

1 21. The method as set forth in claim 1, further comprising monitoring messages  
2 transmitted by the stations and generating an event log.

1 22. The method as set forth in claim 21, wherein generating the event log  
2 comprises identifying each station in the network and indicates an order of transmission  
3 authority.

1 23. The method as set forth in claim 21, wherein generating the event log  
2 comprises recording errors detected during operation of the network.

1           24.    The method as set forth in claim 21, wherein generating the event log  
2   comprises tracking successful delivery of each message.

1           25.    The method as set forth in claim 21, further comprising tracking a wavelength  
2   of operation for each station.

1           26.    The method as set forth in claim 1, further comprising assigning a unique  
2   address to each station.

1           27.    The method as set forth in claim 1, further comprising assigning stations  
2   different wavelengths to transmit messages.

1           28.    The method as set forth in claim 1, further comprising assigning stations  
2   wavelengths to receive messages.

1           29.    The method as set forth in claim 1, further comprising assigning stations  
2   frequencies to transmit messages.

1           30.    The method as set forth in claim 1, further comprising assigning stations  
2   frequencies to receive messages.

1           31.    The method as set forth in claim 1, further comprising detecting an absence of  
2   a message from one of the stations.